at Quetta. His foundation of this college and his establishment of the institution at Khartum are evidence sufficient of his interest in education. Indeed, in his knowledge of science and in his appreciation of its utility Kitchener may be said to stand alone amongst great military administrators.

We get some clue to the Kitchener method if we bear these facts in mind, and we are enabled to see how, forsaking the practice of a scientific profession for the more ambitious sphere of civil administration and diplomacy, varying these with intervals of command of armies in peace and war, ending as an organiser of victory, he accomplished his ends with such extraordinary success.

No account of the life and work of this man will ever be complete which neglects a consideration of the influence exerted upon him by his early education. Kitchener understood the language of men of science. Consciously or unconsciously he adopted their methods. He was never out of date. We get a clue to his dislike of the bureaucrat, to his hatred of red tape, and to his contempt for precedent and of War Office methods, if we bear these in mind. We are not surprised when we hear that he "would rather sweep a crossing" than go to the War Office, for freedom to work on new lines—"always a learner,"as his biographer tells us—was the very essence of the Kitchener method. When Lord Curzon and Lord Haldane characterised his organisation of the Army in India as "scientific" they were nearer the mark than perhaps even they recognised; for in the widest acceptation of the term Kitchener was a man of science, and Sir George Arthur's record of his remarkable career will find many appreciative readers in the scientific world.

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## The Nation's Food.

*Food Supplies in Peace and War.* By Sir R. Henry Rew. Pp. vii + 183. (London: Longmans, Green, and Co., 1920.) Price 6*s*. 6*d*. net.

SIR HENRY REW has the happy and unusual faculty of making statistics interesting; indeed, the only time when he is less interesting than usual is when he is quoting fewer figures. In this little book he has brought together the vital statistics of British food supplies and set them out: they tell their own tale so plainly that even the ordinary non-statistical person can understand.

The book was badly needed, for it is highly important that the average man should realise the facts. Unfortunately, agricultural policy is a matter for politics and emotions, and political considerations have sometimes been more in evidence than facts or business principles. Recently a bishop wrote to the *Times* making the astonishing statement that he thought the bread subsidy was paid to farmers to encourage corn production. If such amazing lack of knowledge can occur in high places, what must be the state of the ordinary voter's mind? Sir Henry Rew's book will supply the facts for those who will take the trouble to read it.

In the first chapter he deals with the problem as it was before the war, when we had a considerable balance of money due from abroad which we could take either in food or in other commodities. The general result is shown in the following table :—

| — | Weight in metric tons used in the United Kingdom per annum.[1] | | |
|---|---|---|---|
| | Home-grown. | Imported. | Total. |
| Cereals ... ... ... | 1,010,000 | 3,855,000 | 4,865,000 |
| Meat ... ... ... | 1,615,000 | 1,070,000 | 2,685,000 |
| Poultry, eggs, game, and rabbits ... ... ... | 170,000 | 161,000 | 331,000 |
| Fish ... .. ... ... | 715,500 | 132,900 | 848,400 |
| Dairy produce (including lard and margarine) ... | 4,704,000 | 527,800 | 5,231,800 |
| Fruit ... ... ... | 341,000 | 930,000 | 1,271,000 |
| Potatoes and other vegetables ... ... ... | 4,788,000 | 694,000 | 5,482,000 |
| Sugar (including cocoa and chocolate) ... ... | — | 1,657,000 | 1,657,000 |

[1] A certain amount of cottage and farm produce is not included in the above table.

About one-fifth of the cereals, more than half the meat, and nine-tenths of the dairy produce and of the potatoes were home-grown. The total amount of foodstuffs, home-grown and imported, was considerable, and the nation was amply supplied with food. In 1913 the main sources of supply outside the United Kingdom were, in order of value of shipments, the United States, Argentina, Denmark, Canada, India, Australia, Russia, the Netherlands, Germany, New Zealand, Austria-Hungary, France, Spain, and Ceylon.

The second section of the book deals with wartime conditions. The outbreak of the war came, no doubt deliberately, at the time when the harvest of Central Europe was practically all gathered in, and when, therefore, there were ample stocks of food for a year. On our side the wheat crop in the United States was good, and although in Canada it was short, the total North American supply was well above the average. The year 1915 opened badly, as the Russian supplies were cut off in February. The situation was saved,

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however, by the heavy crops in India and Argentina. Australia considerably increased her wheat area, as did also the United States and Canada; indeed, during the first year of the war the wheat area of the world was extended by more than 18,000,000 acres. In the later years of the war the difficulty was one of transport rather than of total supply; a great effort was therefore made after the close of 1916 to increase food production in the United Kingdom. The methods and results have been discussed from time to time in these columns: the general result was a steady increase in production right up to 1918, the figures for the United Kingdom being in thousands:—

| | | 1914 | 1915 | 1916 | 1917 | 1918 |
|---|---|---|---|---|---|---|
| Wheat ... | quarters | 7,804 | 9,239 | 7,472 | 8,040 | 11,643 |
| Barley ... | ,, | 8,066 | 5,862 | 6,613 | 7,185 | 7,760 |
| Oats ... | ,, | 20,664 | 22,308 | 21,334 | 26,021 | 31,196 |
| Beans ... | ,, | 1,120 | 924 | 893 | 474 | 931 |
| Peas ... | ,, | 374 | 300 | 261 | 278 | 441 |
| Potatoes... | tons | 7,476 | 7,540 | 5,469 | 8,604 | 9,223 |

This high production was obtained at a time when manures were scarce and implements difficult to repair, and when most of the skilled men were gone, their places being taken by old people, women, and children. But these substitutes worked with a will, and amply made up in enthusiasm what they lacked in skill. Even the high production of 1918 was not the maximum possible, and had the conditions persisted, even higher results could have been obtained.

The last section of the book deals with post-war conditions. Serious fears had been entertained as to the food supplies of the world; fortunately, these have not been realised, and although food is undoubtedly scarce and will remain so there is no reason to fear famine, and in the main the people of Europe, though still suffering privation, are better fed than they were in 1918. It is difficult to say what the position is likely to be in the near future, but the redeeming feature is the rapidity with which agriculture has been restarted in the devastated areas of France and Belgium. Of the 4,000,000 acres damaged by the war, nearly a quarter were handed back to the cultivators before a year had elapsed. On the other hand, agriculturists in our own country are not producing so much as they did. The withdrawal of the women from the land and their replacement by men coincided with a considerable fall in production, which is distinctly unfortunate. A further fall is anticipated as a result of the shortened hours of labour.

Other countries, however, are in a worse predicament. Russia, formerly one of the chief wheat-producing countries of the world, is unlikely to have any exportable surplus, and the position in Central Europe is still very obscure. Sir Henry Rew is not greatly perturbed, but thinks that if the social and political conditions of Europe became settled, its food production would rise to pre-war level in the course of two or three years. He is also quite hopeful about the position in this country. No student of British agriculture can ever give up hope of the future, and Sir Henry Rew is one of the leaders of the helpful band of optimists.

E. J. RUSSELL.

## Differential Geometry.

*The Elementary Differential Geometry of Plane Curves.* By R. H. Fowler. (Cambridge Tracts in Mathematics and Mathematical Physics. No. 20.) Pp. vii + 105. (Cambridge: At the University Press, 1920.) Price 6*s.* net.

DIFFERENTIAL geometry is a fascinating subject, because it gives us vivid and picturesque embodiments of theorems obtained by the combination of several branches of pure analysis, such as algebra, function-theory, and the infinitesimal calculus. It presents us with problems of all degrees of difficulty, from the comparatively simple theory of curvature and torsion to the provokingly difficult question of geodesics.

The present tract is just what its title indicates, except that there are a few digressions on twisted curves and on surfaces. The work has two conspicuous merits; in applying the differential calculus, the assumptions made are explicitly pointed out, and proper attention is paid to the determination of sign. The latter point is particularly important, not only because an error in sign is the one most frequently committed in computation, but also because, if a consistent determination of sign is not strictly adhered to, the formulæ of analytical and even of pure geometry cease to have general validity. Even now our text-books, especially in analytical geometry, pay so little attention to this matter that a university teacher has to spend much valuable time on this topic with intermediate students, and too frequently finds, to his disgust, that even an honours student is not so careful as he should be in the matter of sign.

Mr. Fowler's chapters on tangents and normals, curvature, contact and envelopes, leave little, if anything, to be desired. The chapter on envelopes is the most thorough-going, and suggests a couple of remarks. The elimination of $\alpha$ from the equations $f(x,y,\alpha)=0, \partial f/\partial\alpha=0$ leads to a definite locus

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